PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re

UNITED STATES PATENT APPLICATION

Of

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Relating to

TRANSFORMER FOR DIMMER SWITCH OR ON/OFF SWITCH AND METHOD OF USE

CROSS-REFERENCE TO RELATED APPLICATION

The present application claims the benefit of the filing date of co-pending United States Provisional Application Serial Number 60/462,500, filed April 11, 2003, and titled TRANSFORMER FOR DIMMER SWITCH OR ON/OFF SWITCH AND METHOD OF USE.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to transformers generally and, more particularly, but not by way of limitation, to a novel transformer for use with a dimmer switch or an on/off switch and a method of use thereof.

Background Art

A conventional transformer for lighting systems can be used with either a dimmer switch or an on/off switch. A disadvantage of such an arrangement is that when the transformer is used with a dimmer switch, the voltage applied to the lighting system at full input is less than when the same transformer is used with an on/off switch in "ON" position. The result is that the light level output of the lighting system at full output of the dimmer switch is substantially less than that when the transformer is used with an on/off switch in "ON" position.

Accordingly, it is a principal object of the present invention to provide a transformer and method that can be used with either a dimmer switch or an on/off switch and wherein the light level at full output of the lighting system with which the transformer is used is approximately the same with either a dimmer switch or an on/off switch.

A further object of the invention is to provide such a transformer that is economical to construct.

An additional object of the invention is to provide such a method that

can be easily implemented.

Other objects of the present invention, as well as particular features, elements, and advantages thereof, will be elucidated in, or be apparent from, the following description and the accompanying drawing figures.

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BRIEF DESCRIPTION OF THE DRAWING

Understanding of the present invention and the various aspects thereof will be facilitated by reference to the accompanying drawing figures, provided for purposes of illustration only and not intended to define the scope of the invention, on which:

Figure 1 is a graph of percentage light output vs. lamp voltage.

Figure 2 is schematic of a transformer, with primary side taps, and with a dimmer switch installed in the primary circuit thereof.

Figure 3 is a schematic of the transformer of Figure 1, with primary side taps, and with an on/off switch installed in the primary circuit thereof.

Figure 4 is a schematic of a transformer, with secondary side taps, and with a dimmer switch installed in the primary circuit thereof.

Figure 5 is a schematic of the transformer of Figure 3, with secondary side taps, and with an on/off switch installed in the primary circuit thereof.

SUMMARY OF THE INVENTION

The present invention achieves the above objects, among others, by providing, in a preferred embodiment, a transformer system for use with either a dimmer switch or an on/off switch, comprising: a transformer; a load connected to said transformer; a first tap connected to said transformer to provide a first voltage; and a second tap connected to said transformer to provide a second voltage higher than said first voltage. A method using said transformer system is also provided.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference should now be made to the drawing figures on which similar or identical elements are given consistent identifying numerals throughout the various figures thereof, and on which parenthetical references to figure numbers, when used, direct the reader to the view(s) on which the element(s) being described is (are) best seen, although the element(s) may be seen on other figures also.

Figure 1 illustrates the dramatic drop-off in light output as lamp voltage is decreased. Although the light outputs and voltages shown on Figure 1 are for a nominal 12-volt lamp, provided for illustrative purposes only and not intended to limit the scope of the present invention, the decrease in light output is similar for lamps of other voltages. The output voltage of a lighting industry standard 12-volt transformer is about 11.4 volts at about 120-volt input, giving a light output of about 85 percent of 12 volts when an on/off switch is used, a reasonable level. However, when a dimmer switch is used, the maximum output voltage is about 10.6 when the dimmer switch is at full bright, giving a light output of about 64 percent of rated light output at 12 volts. Thus, a decrease in voltage of about 12 percent from 12-volts has resulted in a light output decrease of about 36 percent of maximum – an undesirable result, which the present invention addresses. It will be understood that the present invention compensates for the loss introduced by a dimmer switch.

Figure 2 illustrates a transformer system, constructed according to the present invention, and generally indicated by the reference numeral 10. Transformer system includes a transformer 12 having a primary winding 20 with two primary side taps, TAP-1 and TAP-2, and with a dimmer switch 30 connected to TAP-2. The secondary circuit includes a secondary winding 40 and a "LOAD" 50 which may be assumed to be a lighting system.

Figure 3 illustrates transformer system 10 with an on/off switch 60

connected to TAP-1.

According to the invention, the connections of side taps TAP-1 and TAP-2 to primary winding 20 are selected such that the secondary voltage is higher when dimmer switch 30 is used (Figure 2) than when an on/off switch 60 is used (Figure 3), the higher voltage in the first case compensating for the reduction in voltage when dimmer switch 30 is used. Therefore, the same transformer can be used in either case to produce approximately the same lighting level from load 50 regardless of whether dimmer switch 30 is used or on/off switch 60 is used, the voltage compensation being provided when dimmer switch 30 is connected to TAP-2 rather than TAP-1.

Figure 4 illustrates a transformer system, constructed according to the present invention, and generally indicated by the reference numeral 100. Transformer system 100 includes a transformer 112 having a primary winding 120 that has a dimmer switch 130 connected thereto. Transformer 100 also includes a secondary winding having two secondary side taps TAP-1 and TAP-2. In this case, the load 150, which may be assumed to be a lighting system is connected to TAP-2.

Figure 5 illustrates transformer system 100 with an on/off switch 160 connected to primary winding 120. In this case, load 150 is connected to TAP-1.

It will be understood, with reference to Figures 4 and 5, that TAP-2 is at a higher voltage than TAP-1, the difference compensating for the voltage loss in dimmer switch 130 (Figure 2), such that the full lighting level of load 150 with dimmer switch 130 is the same as with on/off switch 160 (Figure 5) in "ON" position.

In either case, the unused tap, TAP-1 or TAP-2, is simply ignored. Thus, the same transformer can be used for either the dimmer switch situation or the on/off switch situation, while providing the same maximum output lighting level

from each.

Although Figures 2-5 show toroidal transformers, the present invention is applicable as well to other types of conventional transformers, such as laminated and electronic transformers, the toroidal transformers being shown for illustrative purposes only and are not intended to limit the scope of the invention.

In the embodiments of the present invention described above, it will be recognized that individual elements and/or features thereof are not necessarily limited to a particular embodiment but, where applicable, are interchangeable and can be used in any selected embodiment even though such may not be specifically shown.

Spatially orienting terms such as "above", "below", "upper", "lower", "inner", "outer", "inwardly", "outwardly", "vertical", "horizontal", and the like, when used herein, refer to the positions of the respective elements shown on the accompanying drawing figures and the present invention is not necessarily limited to such positions.

It will thus be seen that the objects set forth above, among those elucidated in, or made apparent from, the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown on the accompanying drawing figures shall be interpreted as illustrative only and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.